Space Weather Forecast

Issued on Thursday, 24 March 2022 at 12:37 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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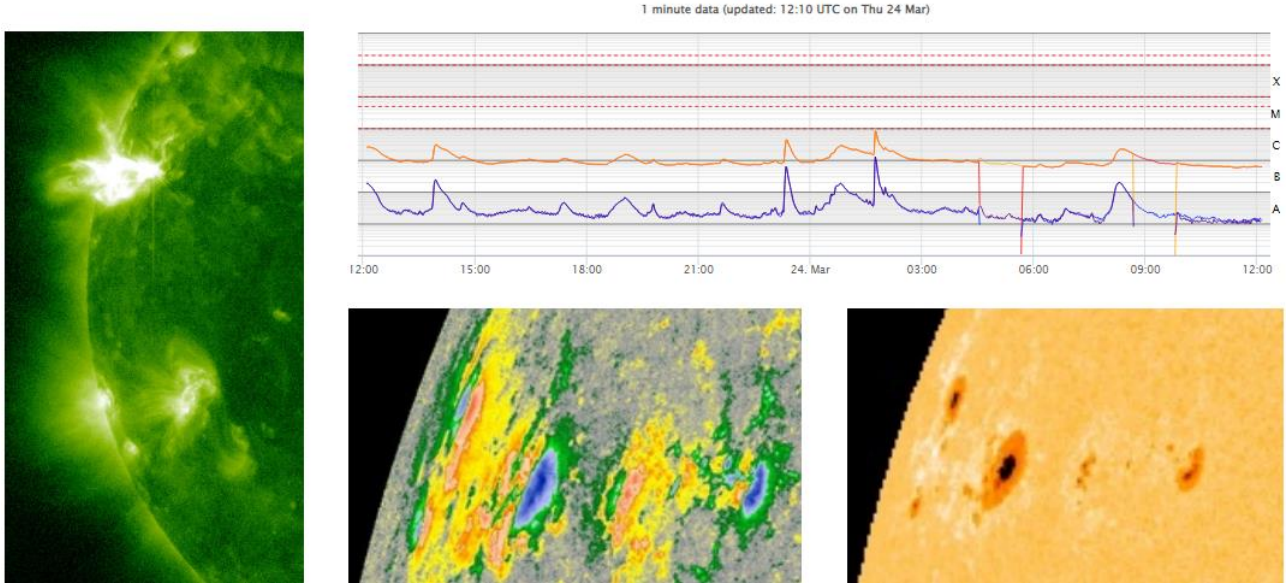
Space Weather Forecast Headline: Daily Slight Chance of R1/R2 Minor/Moderate Radio Blackouts. Risk of Minor Geomagnetic Storm G1, probably peaking over UTC weekend.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been low over the past 24 hours, with frequent low-level common-class X-ray activity interspersed with occasional larger common-class flares. The largest X-ray event was observed from the largest group on the sun at 24/0145UTC, with this group generally proving most active. Having previously been described as one continuous region, further rotation has revealed that a pair of sunspot groups in close proximity may better describe the northeast of the sun. Much of the dynamism from the group is coming from the leading portion, with proliferation and spreading observed in the past 24 hours, with the trailing group more stable - perhaps partially masked by the poorer viewing angle. The only other sunspot group on the sun was smaller and less complex in the sun's southeast.

No Earth-directed Coronal Mass Ejections (CMEs) were observed in the last 24 hours.

Figure 1: Clockwise from left: false-colour extreme UV image showing a proxy for the peak X-ray event of the past 24 hours – a large common class flare; associated X-ray flux (with the spike at 24/0145UTC); visible imagery from 24/1200UTC showing the spots near the northeastern solar horizon; magnetic imagery showing the structure of the northeastern quadrant.



Solar Wind / Geomagnetic Activity: The solar wind transitioned from a slow regime to fast in the 24 hours, with the speed showing a gradual rise from background to become elevated. This is

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probably the onset of a 'coronal hole' high speed stream, with the number of particles in the solar wind and theit asscoiated magnetic fields both also slightly elevated at times. The north-south component of the solar magnetic field was more often than not co-aligned with Earth's field to limit geomagnetic effects in the 24 hours, peaking well below Minor geomagnetic storm G1, even at peak.

Energetic Particles / Solar Radiation: No solar radiation storms were observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Common-class X-ray flares are expected in the period, with a daily slight chance of moderate-class. Further sunspot regions are also expected to rotate onto the facing side over the next four days, with the outlook potentially seeing an increase in flare risk - the degree to which this occurs pending these arrivals for analysis.

Solar Wind / Geomagnetic Activity: There is a Slight Chance of Minor Geomagnetic storm G1 over the remainder of day one from the possible combined effects of the current fast wind and any peripheral 20 March CME, with the tail of risk continuing into Friday 25 March owing to low confidence in the CME especially. There should then be a short lull before a more assured chance of G1 from a further, probably larger and more sustained fast wind enhancement later on day three, Saturday 26 March, continuing Sunday.

Energetic Particles / Solar Radiation: No solar radiation storms are expected.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	**G1 to G2**	No	10	5	40	30
Strong	**G3**	No	1	1	1	1
Severe	**G4**	No	1	1	1	1
Extreme	**G5**	No	1	1	1	1

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Radio Blackouts - X Ray Flares:

X Ray Flares	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability			(%)	(%)	(%)	(%)
Active	R1-R2 M Class	No	20	20	20	20
Very Active	R3 to R5 X	No	1	1	1	1

Solar Radiation Storms - (High Energy Protons):

Radiation Storms	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Active	≥ S1	No	1	1	1	1
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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